

NOTES ON THE ETHOLOGY OF  
*ECCRITOSIA ZAMON* (DIPTERA, ASILIDAE)<sup>1, 2</sup>

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*Abstract.*—Adults of *Eccritosisia zamon* (Townsend) were collected resting on sand and vegetation bordering a stream in the State of Colima, Mexico. Matings took place, without courtship, in the male over female position. Oviposition occurred when the female inserted her ovipositor into vegetation-shaded sand.

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Despite its large size and colorful appearance (black and orange), almost nothing has been recorded concerning *Eccritosisia zamon* (Townsend), with the exception of a few isolated distribution records.

*Eccritosisia zamon* was originally described by Townsend (1895) as *Proctacanthus zamon* from a series of 20 females and 37 males collected at San José del Cabo, Baja, California. It was apparently almost immediately confused with *Eccritosisia amphinome* Walker; Schaeffer (1916) records taking a specimen of the latter species in the Huachuca Mountains of Arizona, as well as noting that the Aldrich catalog (1905) listed it as occurring in lower California, Mexico, Guatemala and Honduras. Under the same name, Bromley (1934) recorded that R. H. Painter had noted it as occurring in the southwestern part of Texas. Apparently most of the original series was destroyed, but five specimens found their way to the American Museum of Natural History where they were rediscovered by Curran. Based on differences in genitalic structure, Curran (1934) was able to verify that *E. zamon* is a species distinct from *E. amphinome*, the latter occurring in Costa Rica and the Honduras. Using Curran's key, Wilcox (1937) suggested that the specimens recorded by both Schaeffer and Bromley were misidentified and Wilcox redescribed the species from specimens collected in Arizona. Bromley (1951) acknowledged his error and, from the series of specimens at the American Museum, he established a holotype and allotype. Bromley (1951) illustrated his paper with a photograph of *E. zamon* taken at Presidio, Texas on 1 September 1934. No further mention of this species appeared in the literature until Martin (1965), commenting on species whose center of distribution is in Mexico, noted that "*Eccritosisia zamon* (Townsend) ranges from Texas and Arizona as far south as Salina Cruz, Oaxaca in Southern Mexico, a distance of nearly 200 miles."

Specimens of *Eccritosisia zamon* were discovered in the same habitat as *Apiocera clavator* Painter (Lavigne, 1975) in vegetation bordering a stretch of sand along the edge of an unidentified stream, about 1 km east of El Centinela, Colima, Mexico. The turnoff (Camino Chavarin) to this semi-



Fig. 1. Male *Eccritotia zamon* resting on sand in early morning. Fig. 2. Mated pair of *Eccritotia zamon* resting on stem of *Mimosa pigra* L.

isolated village is about 16 km north of Manzanillo. The dominant vegetation bordering the sandy overflow area was *Mimosa pigra* L., a mesquite type of plant which grows in almost impenetrable clumps and to a height of about 3.05 m on this site.

The small population was observed over a period of six days, from 12-17 May 1973. On the first day, only one male was observed, none having been seen on 11 May. No females were observed until the morning of 14 May. During the period of observation the population reached approximately 20 individuals in number.

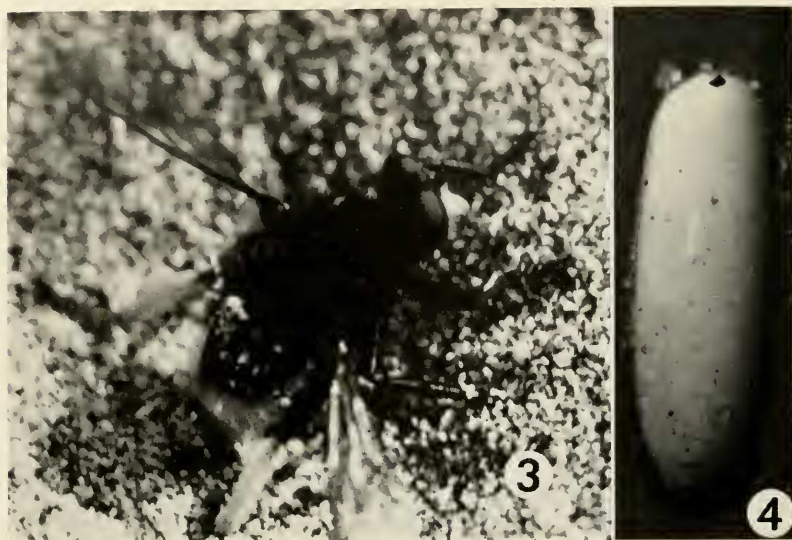


Fig. 3. Female *Eccritosisia zamon* ovipositing in sand in the shade of a branch of a shrub willow. Fig. 4. Egg of *Eccritosisia zamon*, magnified  $50\times$ , recovered from the sand.

Individuals were present, landing on the surface of the sand, when the author arrived daily, between 8 and 8:30 AM (Fig. 1). By approximately 11:10 AM all individuals in the population had completely disappeared, not to be seen again until the following morning. Attempts to follow individuals as they disappeared into the almost impenetrable *Mimosa* clumps were unsuccessful. Forays into the vegetation later in the day yielded no specimens.

Like other species of asilids studied, *Eccritosisia zamon* responds to changes in substrate temperature by changing position. Normally when first seen in the morning, specimens were alighting on the surface of the sand. Sand surface temperatures at 8 AM were usually approximately  $34^{\circ}\text{C}$ , increasing to about  $38\text{--}41^{\circ}\text{C}$  at 9 AM and to  $\pm 50^{\circ}\text{C}$  by 10 AM. By the time this latter temperature was reached, all specimens observed had moved up onto vegetation at heights varying from 7.6 cm to 12.2 dm.

At no time during the six days of observation were any specimens observed with prey. On occasion, individual males were observed making flights in the direction of low-flying, dark brown hesperiid butterflies [probably *Urbanus simplicius* (Stoll)], but no contact was made. It is felt by the author that they were responding to a generalized female image rather than to a prey image. In all probability, foraging took place during the afternoon amongst the flowering *Mimosa* shrubs. The only prey ever recorded for this species were reported by Bromley (1934), apparently quoting a personal communication with R. H. Painter, the bombyliid spe-

cialist: "This species is said . . . to feed largely on Hymenoptera. 'Brownwood, Sept. 17, 1921, male with vespoid as prey; San Saba, Aug. 25, 1921, male with vespoid as prey' (R.H.P.)."

There is apparently no attempt at courtship in this species. The initiation of mating was observed only once, this in the air, although a second male was observed to attempt copulation unsuccessfully in this manner. On numerous occasions male-to-male aerial encounters were observed, indicating that males, unable to distinguish females because of their identical color pattern, were searching for the female image. During male-to-male encounter sequences, a male occasionally buzzed another male resting on the sand or upon encountering each other in flight, males circled each other several times with one male flying off, followed by another.

Mated pairs were observed on four occasions, the first two on the third day following the sighting of the first male by the author. The male lands on top of the female and the pair remain in this position throughout the mating act, flying from place to place in *copula* when disturbed. Once copulation takes place, the mated pair land on willow or *Mimosa* branches at heights ranging from 3–7.5 dm. All mated pairs were first observed between 8:46 and 9:47 AM with temperatures ranging from 30–35°C at that height. In the single instance where a complete mating was timed, the initiation of copulation occurred at 9:05 AM and separation occurred at 11:04 AM, a total of 119 minutes. During copulation the male rests with his fore tarsi on the dorsolateral angles of the front margin of the female's thorax. The male's mid tarsi cross the basal abdominal segments and the hind tarsi appear to grasp the female's wings (Fig. 2). The female's wings are spread to a 90° angle, while the male's wings remain closed throughout the act. Approximately 15 minutes after the initiation of mating, the female began pushing at the male genitalia with her hind tarsi, moving them rapidly. She repeated this act 12 times at intermittent intervals, usually cleaning the hind tarsi directly thereafter. However, she only cleaned her eyes and proboscis twice during the mating act.

Separation occurred on the branch with the male releasing his claspers and flying 3–4.5 dm. The female flew off immediately thereafter. The other three pairs observed separated in the same manner, without any prior movements to indicate the approaching end of the mating. The males did not buzz their wings at any time during the mating act, and on only one occasion did a male make any unusual movements. This was when the male vibrated his fore tarsi on the female's thorax 47 minutes into the complete mating.

Ovipositing females were observed on three separate occasions, all on the third day following the first sighting of a female. All observed ovipositions occurred between 8:47 and 10:10 AM on 14 May 1973. The ovipositor is inserted into the sand, accompanied by up and down movements of the

wings. The female's abdomen is completely inserted in the sand. Figure 3 shows a female in the process of removing her ovipositor from the sand. During oviposition the wings are spread to an approximate 90° angle. Removal of the ovipositor is accompanied by sweeping movements similar to those exhibited by *Stenopogon* sp. These movements result in sand being swept into the hole left by the ovipositor. Observed ovipositions were in areas shaded by willows or *Mimosa*, where temperatures beneath the surface of the sand ranged from 32–38°C. A single white egg, 0.5 × 1.5 mm, was recovered by sifting sand from the oviposition sites (Fig. 4).

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### Footnotes

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